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Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv)) for US only*

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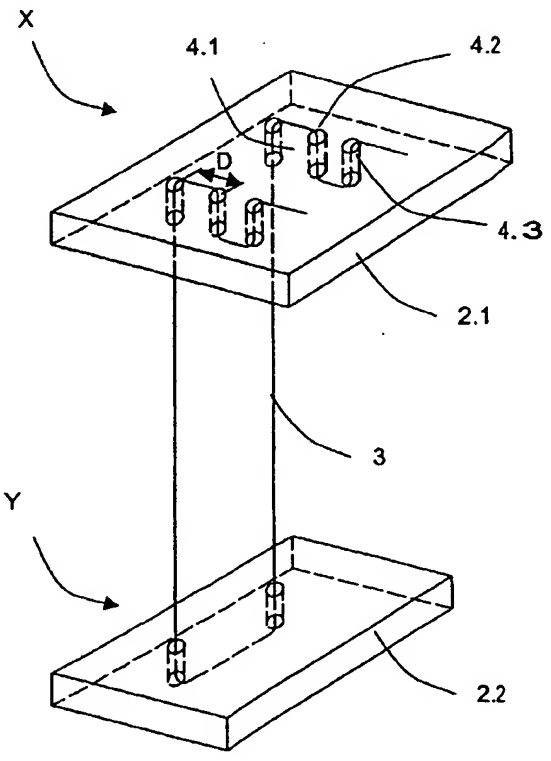
(54) Title: ARRANGEMENT FOR FASTENING THE END OF THE WIRE IN A FRAME AND A WIRE CUTTER



(57) Abstract: An arrangement is disclosed for securing the end of a cutting wire in a wire cutter (1) to the cutter support structure, the wire cutter comprising at least one wire (3) spanned in the support structure, most advantageously having a frame shape. To the support frame structure (2), on the side thereof intended to accommodate the cutting wire end, are made at least two holes (4.1, 4.2) having the cutting wire end threaded therethrough.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

ARRANGEMENT FOR FASTENING THE END OF THE WIRE IN A FRAME AND A WIRE CUTTER

Background of the invention

The invention relates to an arrangement according to the preamble of claim 1 for securing the end of a cutting wire in a curd wire cutter to the cutter support structure.

The invention also relates a curd wire cutter according to claim 7.

In the wire cutters used for cutting food industry products, particularly coagulated curds, that are employed in the manufacture of granulated curd cheese, for instance, the ends of the cutting wire are conventionally secured by tying the wire ends to the cutter frame or knotting them with each other.

Inasmuch very high hygienics standards are set to the food industry, easy cleaning of equipment, e.g., cutting devices used in cheese manufacture is an extremely important issue. The conventional ways of tying the ends of the cutting wire, such as knotting and twisting the wire ends with each other, do not fulfill the requirements set for hygiene and cleanability.

It is an object of the present invention to provide an entirely novel type of arrangement for hygienic attachment of the cutting wire end in a wire cutter to the cutter support structure. Another object of the invention is to provide a wire cutter of improved cleanability.

Brief description of the invention

The arrangement according to the invention is characterized in that the cutter support structure is provided with at least two holes at the secured end of the cutter wire through which the wire end is threaded.

More specifically, the securing arrangement according to the invention is characterized by what is stated in appended claims 2 – 6.

Furthermore, the wire cutter according to the invention is characterized by what is stated in appended claim 7.

The arrangement according to the invention offers a number of significant benefits. The arrangement provides a hygienic attachment of the cutting wire of a wire cutter to the cutter support structure. By arranging the attachment of the wire end to take place by way of threading the wire through holes made in the cutter support structure, a cutting wire arrangement is achieved easier to keep clean than the prior-art technique of knotting or twisting the cutter wire ends with each other. In the present arrangement, the end of the cutter wire can be readily secured by virtue of friction and the inherent stiffness of the cutter wire after the wire is threaded through the holes made in the cutter support structure. A wire cutter implemented using the arrangement according to the invention is easy to keep clean and it is more compatible with concurrent hygienic standards than the prior-art arrangements.

Brief description of the drawings

In the following, the invention is elucidated in more detail with the help of an exemplary embodiment by making reference to the attached drawings in which

FIG. 1 shows a wire cutter according to the invention; and

FIG. 2 shows details X and Y of FIG. 1 in an enlarged scale.

Detailed description of the invention

Referring to FIG. 1, a wire cutter 1 according to the invention is shown therein. The wire cutter comprises a support structure 2, typically but not necessarily of a rectangular frame shape, wherein the cutting wire is arranged to be threaded from a first end frame 2.1 of the cutter support structure to a second, advantageously opposite-side end frame 2.2 of the support structure. The support structure is made from, e.g., lengths of a continuous section having their ends connected to each other by, e.g., welding. In the wire cutter shown in the diagram, the support structure comprises a rectangular frame having a plurality of wires 3 substantially spanned across area of the the frame and spaced at a distance from each other so that the area delineated by the support frame is subtended by wires tensioned side-by-side in a substantially parallel fashion.

In FIG. 2 is shown in more detail and in an enlarged scale the attachment of the wire ends to the cutter support structure at points X and Y of FIG. 1.

The invention is particularly directed to an arrangement for attaching the cutting wire end in a wire cutter to a support structure 2, the wire cutter comprising at least one cutting wire 3 spanned in a support structure most advantageously implemented as a frame. To the support structure 2 are made at least two holes 4.1, 4.2 having the cutting wire end 3 threaded therethrough. According to a preferred embodiment, to the support structure are made three holes 4.1, 4.2, 4.3 having the cutting wire end threaded therethrough. The cutting wire end is threaded via adjacent holes 4.1, 4.2, 4.3 of support structure end frame 2.1 so as to meander about the opposite sides of support structure end frame 2.1.

Typically, the cutting wire 3 is of a relatively stiff material. The material of cutting wire 3 is generally a metal such as stainless or acid-proof steel.

The cutting wire end is threaded through the first hole 4.1 from a first direction, through the second hole 4.2 from a second direction substantially opposite to the first direction and then through the third hole 4.3, again from a substantially opposite direction.

The cutting wire end securing arrangement according to the invention makes use of the inherent stiffness of the cutting wire and the friction between the wire and the support structure. According to an exemplary embodiment, the adjacent holes 4.1, 4.2, 4.3 are spaced apart from each other by a distance D of 2 mm to 50 mm, most advantageously by 4 mm to 12 mm. The dimensions are selected by such criteria as the materials of the cutter and the cutting wire thickness, for instance. According to an exemplary embodiment, the diameter of the cutting wire typically is in the range 0.1 – 5 mm, advantageously 0.2 - 1 mm, most advantageously 0.3 – 0.6 mm, whereby the hole diameter typically is in the range 0.5 – 7 mm, advantageously 1 – 6 mm, most advantageously 3.5 – 5 mm.

The invention also is directed to a wire cutter utilizing a cutting wire end securing arrangement according to the invention.

To a person versed in the art it is obvious that the invention is not limited to the exemplary embodiments discussed above, but rather can be varied without departing from the scope and spirit of the invention disclosed in the appended claims. The characterizing features disclosed possibly in conjunction with some other features may also be interpreted as independent characterizing features.

WHAT IS CLAIMED IS

1. An arrangement for securing the end of a cutting wire in a wire cutter (1) employed in the food industry, particularly a wire cutter intended for cutting curd, to the cutter support structure, the wire cutter comprising at least one wire (3) spanned in the support structure, most advantageously having a frame shape, **characterized** in that to the wire cutter support structure (2), at the terminating side of the cutting wire, are made at least two holes (4.1, 4.2) having the cutting wire end threaded therethrough.

2. The arrangement of claim 1, **characterized** in that to the support structure (2), at the terminating side of the cutting wire, are made three holes (4.1, 4.2, 4.3) having the cutting wire end threaded therethrough.

3. The arrangement of claim 1 or 2, **characterized** in that the cutting wire end is threaded via the adjacent holes (4.1, 4.2, 4.3) of the support structure so as to meander about the opposite sides of the support structure end frame (2.1).

4. The arrangement of any one of claims 1 - 3, **characterized** in that the cutting wire (3) is of a relatively stiff material.

5. The arrangement of any one of claims 1 - 4, **characterized** in that the cutting wire (3) is stainless or acid-proof steel wire.

6. The arrangement of any one of claims 1 - 5, **characterized** in that the cutting wire end is threaded through the first hole (4.1) from a first direction, through the second hole (4.2) from a second direction substantially opposite to the first direction and then through the third hole (4.3), again from a substantially opposite direction.

7. A wire cutter (1) employed in the food industry, particularly a wire cutter employed in cutting curd, the wire cutter comprising at least one cutting wire (3) and a support structure (2), the latter having the cutting wire spanned between the opposed end parts thereof, **characterized** in that to the support structure (2) are made at least two holes (4.1, 4.2) having the end of the terminating end of the cutting wire (3) threaded therethrough so as to secure the cutting wire to the support structure.

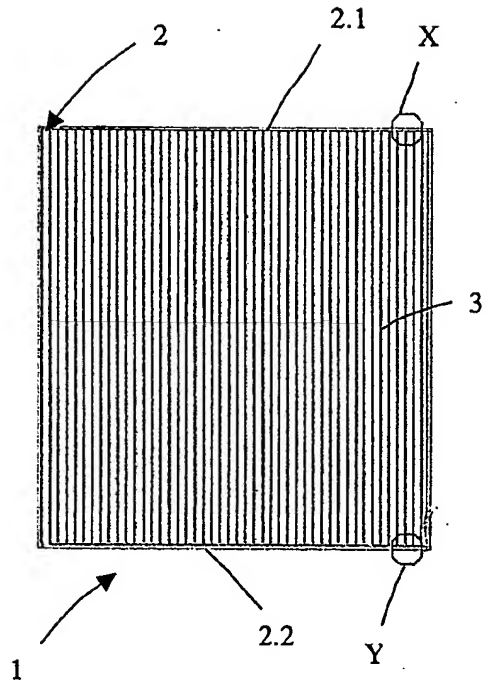

Fig. 1

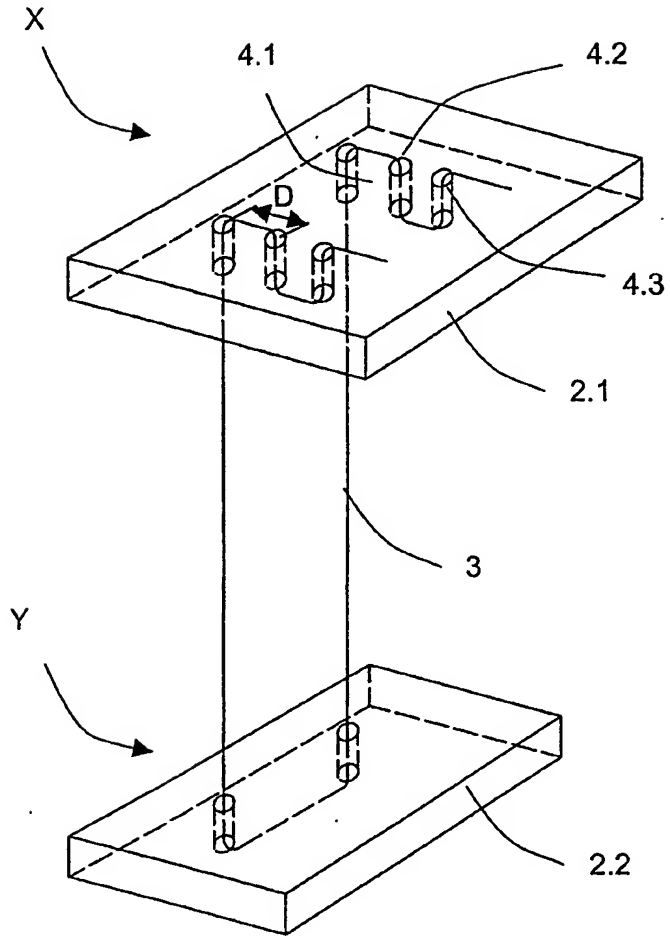

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 2003/000861

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B26D 1/553, B26B 27/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B26D, B26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA, EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2032330 A (GENERLA WADSWORTH BRICK CORP.), 8 May 1980 (08.05.1980), page 1 - page 3, figure 3	1-6
A	--	7
A	US 2472699 A (JOHN GANGEMI), 18 Sept 1946 (18.09.1946), column 1 - column 4, figure 1	1-7
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 January 2004	04 -02- 2004
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer OLA ENGSTRAND/BS Telephone No. +46 8 782 25 00

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Information on patent family members

01/12/2003

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2032330 A	08/05/1980	NONE	
US 2472699 A	18/09/1946	NONE	